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PALESTINIAN AUTHORITY CAPACITY ENHANCEMENT PROJECT

BASELINE ASSESSMENT REPORT FOR ROAD REPAIR UNITS – MINISTRY OF PUBLIC WORK AND HOUSING PALESTINIAN NATIONAL AUTHORITY

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Baseline Assessment Report

Ministry of Public Works and Housing (MOPWH) Road Repair Units

1. Background

The Ministry of Public Works and Housing (MOPWH), with its headquarters in Ramallah, is responsible for routine maintenance and repair of roads. This is outside the jurisdiction of Palestinian Municipalities in Area A and Israeli controlled areas in Area C. Prior to 1995, road repair units, consisting of crews of up to six members with necessary tools and equipment, were active in routine maintenance and in responding to emergency calls. Currently, because of a history of administrative inexperience and lack of budget with the coming of the Palestinian National Authority, most have become inactive, with experienced crews having retired and most equipment no longer operational. The MOPWH wishes to rehabilitate and activate these units in the Ramallah, Hebron, and Nablus districts.

2. Major Findings and Recommendations:

To achieve the objectives of this assignment as outlined in the scope of work, stakeholders meetings as well as field visits were conducted to determine the needs of the three road repair units PACE plans to assist in West Bank (Ramallah, Nablus and Hebron). Major meetings are summarized in the table shown in annex 1 attached.

As a result, we came up with the following baseline assessment:

2.1 Road Repair Equipment:

Field offices in Ramallah, Hebron and Nablus were visited to assess the availability and condition of equipment requested by the MOPWH to either repair or replace. It should be noted that the type and condition of the equipment varied from the information we received from the ministry and its inventory list. Some equipment was badly deteriorated, due to a lack of maintenance and poor storage conditions. Many pieces appeared as if they had never been used, or had not been used in some time. We also determined that other equipment requested by the ministry to repair or replace are not strictly used for the function of maintenance alone, but can also be used for major reconstruction, which is outside of the scope of this phase of the project. For example, all three units requested a backhoe and excavator for maintenance work; however the anticipated work does not justify the procurement of this equipment for the limited purpose of the repair units. With high un-employment in the area, it will be more economical and faster to employ the local labor needed to do the manual work.

The following list of equipment should be available in each road repair unit so that it can operate efficiently:

Equipments:

- Truck-double Kappen.
- Small roller.
- Truck.
- JCB excavator.
- Asphalt scissor (Cutter).
- Tree scissor.
- Small water tank.
- Essential hand tools.
- Striping machine.
- Jack hammer.
- Trolley.
- Traffic signs.
- Communication system.
- Uniform.

Raw material:

- Hot Asphalt.
- Base Materials.
- Liquid Asphalt.
- Liquid Asphalt Crack Seal.
- Guardrail.
- Sidewalk.
- Traffic Signs.

2.2 Personnel Assessment:

The employees designated by the ministry for the pilot units include a total of 3 supervisors and three to four labors. At least two more people are needed to provide traffic control at the work zone. Each unit will need 9 people to conduct work in the field. Please note - the field work cannot take place without the training for the supervisors. The training class is scheduled for April. Overall, it can be said that the supervisors and the operators are very knowledgeable of the maintenance work but refresher course will teach them how to do their work more efficiently, safer, and cheaper.

The new maintenance manual completed should serve as the basis for the design and implementation of training and process reengineering for the repair units. The English versions of those work instructions prepared are attached to this report as annex 5.

The Ministry currently has only one employee on staff designated

Laborers	4
Supervisor	1
Operators	2
Traffic control	2

Total employees - 9

for unskilled labor. This is insufficient and must be addressed if the work of the units is to be sustainable. Options include engaging other donor programs, such as aspects of CHF's Emergency Jobs initiative, to support this need. Ultimately, however, the Ministry must adopt a strategy to employee the labor the road repair units require to carryout designated services.

The maintenance managers are also very knowledgeable in road maintenance work. With some refresher course, they can be very productive in the field.

2.2.1 Proposed Training Courses:

In order to strengthen the staff capacity to carry out jobs as will be described later according to the proposed organizational structure, we proposed the following training courses to be conducted:

- 1- Traffic Engineering: For 3 Engineers for approximately 4 day course.
- 2- Technical Training for Supervisors to include:
 - Preparation of Procedure manual
 - Equipment needed for the proposed repair
- 3- Planning and prioritizing workload.
- 4- Quantities calculation for the area to be repaired.
- 5- Management and supervisory skills
 - Managing Employees Time
 - Communication Skills
 - Administrative Skills
- 6- Computer Knowledge, including MS project.
- 7- Knowledge of providing emergency aid to employees in the field.
- 8- Needed Language skills to facilitate the work.

2.3 Other recommendations:

The MOPWH must establish and operationalize a maintenance department and maintenance protocols for Ministry equipment. The Ministry should work closely with PACE to create a central inventory database which includes maintenance schedules and repair logs. The process reengineering planned should also clearly mandate who will be responsible for updating the database as well as who is responsible for ensuring the maintenance work is completed per established internal procedures. These activities are currently in the year one action plan and should be easy to implement by the end of year one, assuming the Ministry buys into the process and allocates the human resources needed to effectuate all recommendations.

If feasible, the maintenance crew should try and visit other countries to learn about their maintenance operation. As the saying goes "a picture is worth thousand words". I truly believe they will learn much more from observing how other countries address the same issues. The manual developed is just for the 12 services maintenance have agree to. I am sure it will be very helpful if they also review the standards used by other countries.

The estimated yearly operating cost for the repair units will depend on what implementation scenario is used. Three scenarios have been prepared for the project and are attached as annexes 2, 3, and 4 for Hebron, Ramallah and Nablus respectively. The lowest cost scenario is to only repair existing equipment, and provide limited amount of materials. This scenario does not allow for new equipments. The type of raw materials, equipment either in need of repair or replacement, traffic control equipments and safety items are all included in the charts attached.

As for the procurement plan, it is very difficult to estimate the costs associated with equipment repair. PACE should engage a local maintenance expert with knowledge of the local market to make an accurate cost determination. The cost of materials and rough estimate for equipment repair is provided in the tables annexed. Each unit is responsible for providing the 12 services included in the road repair manual. Based on my calculation, each unit can repair 200 kilometers of road per year. The services provided will include repairing potholes, sealing cracks, cleaning drainage facilities, removing object and hazardous materials off the road. My estimated cost per year for each unit is as follow:

Two Operators for the equipment listed before	24,000
One Supervisor monitoring the operation	24,000
4 laborers	18,000
Equipments repair	14,000
Raw materials including Traffic control Items	<u>110,000</u>
Total Each Unit per year	190,000

2.4 Institutionalize the three Road Repair Units:

2.4.1 Services to be delivered:

After our thorough meetings with relevant stakeholders and field visits that were conducted to assess the real needs and services that will be requested from such units, we came up with the following list of services that are demanded and should be delivered by the road repair units:

- 1- Cleaning up the Roadway {the removal of oils, hazardous materials, sediments, etc}.
- 2- Filling of cracks.
- 3- Fix damaged surfaces.
- 4- Fix shoulders.
- 5- Cleaning drainage facilities.
- 6- Minor concrete culvert repair.
- 7- Guardrail fixing and Installation.
- 8- Installing and fixing signs.
- 9- Striping roads.
- 10- Removal of objects from roads.
- 11- Work within the limits of the road way.
- 12- Cleaning and fixing drain main holes.

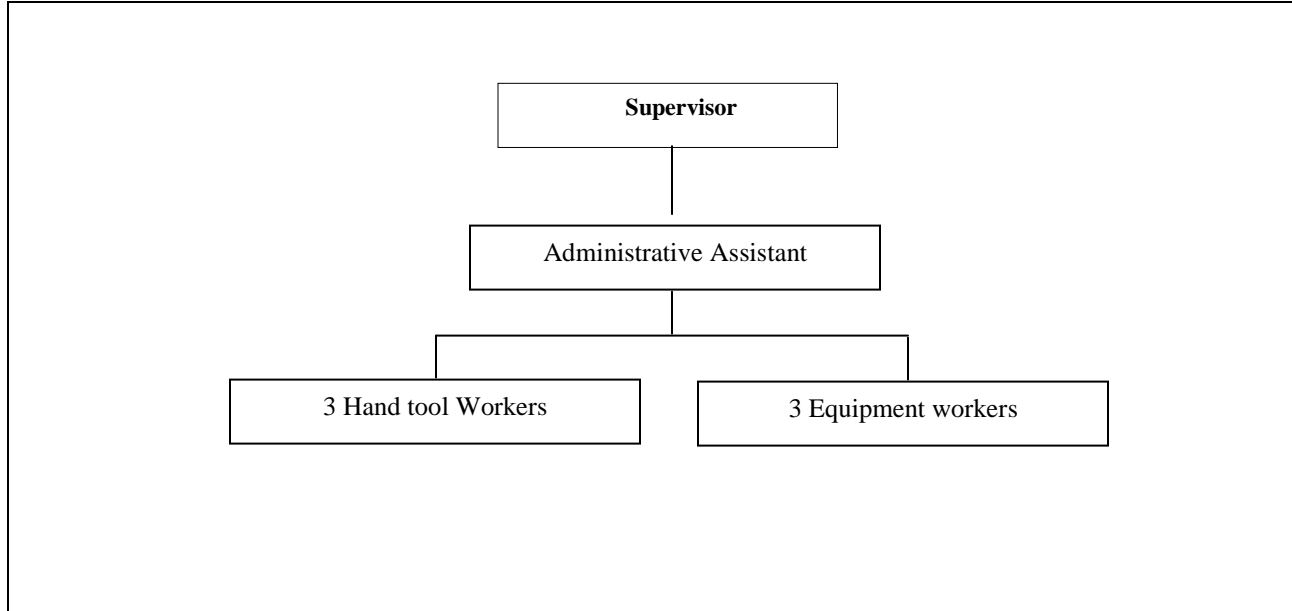
In order to produce the above mentioned services in the most effective and efficient way, a detailed work instructions were developed describing how to carry out each of these services. Those work instructions are shown in annex 5 of this report.

2.4.2 Organizational Structure:

As part of our intervention to build the capacity of these road repair units, and according to the services that are proposed to be carried out by these units, the following is a proposed organizational structure with job descriptions for each proposed position.

The proposed structure, as shown in fig 1, will include: supervisor, administrative assistance, hand tool labor, and equipment users and it was clarified in the chart below:

Fig1: Proposed organizational structure for each road repair unit



2.4.3 Job description and Qualifications:

A job description for each position outlined in the proposed organizational structure is detailed as follows:

- **Job title:** Supervisor
- **Reports to:** Director, Directorate of Public Works in the province.
- **Job description:**
 1. Oversees the daily technical and administrative personnel in the division.
 2. The preparation of the quarterly plan of the Division in coordination with the Department of Roads through the Director of the Directorate.
 3. Follow-up on maintenance of the equipment and machinery.
 4. Prepare the weekly and daily program of work.
 5. The preparation of the necessary programs in case of emergency.

6. Reports periodic achievement to the Directorate.
7. Responsibility for follow-up and assess the daily performance of the work and workers in the Division.
8. Study and assess the complaints received by the Division.
9. Follow-up on the maintenance of public roads within the scope of the work of the Directorate.
10. Responsibility for the annual assessment of the staff of the Division at the end of the year.
11. Develop training plan for the crew in coordination with the Director of the Directorate.

• **Qualifications required:**

1. Degree at least B.Sc. in civil engineering specialization.
2. Experience in the road of not less than 3 years.
3. Experience in the preparation of reports.
4. Capacity for planning, supervision and follow-up.
5. Good knowledge in the use of computers and programs needed.
6. Experience in administrative work.
7. Ability to work within the team.
8. Ability to perform under stress.
9. Have valid driver's license.

- **Job title:** Administrative Assistant
- **Reports to:** Road Repair Unit Supervisor.
- **Job description:**

1. Follow up on all administrative matters for the Unit.
2. Responsibility for the archiving system.
3. Answers complaints from citizens through hotlines.
4. Data entry.
5. Assist in the preparation of reports.

- **Qualifications required:**

1. Holds a degree in Business Administration diploma at a minimum.
2. Experience ranging from 3-5 years.
3. Skills in the use of computers and programs are necessary.
4. Archive and information management skills.
5. High capacity for effective communication and dealing with the public.
6. Experience in writing reports.
7. Ability to work within the team.
8. Performs under stress.

- **Job title:** Equipment Workers
- **Reports to:** Road Repair Unit Supervisor.
- **Job description:**
 1. Performs daily work as directed by the supervisor.
 2. Reports about any defect, or anything regarding to emergency vehicles or to daily operations.
 3. Inspect the machine constantly.
 4. Fill in all forms and reports requested by the unit management.
- **Qualifications required:**
 1. Age should be between 25 to 45 years.
 2. Good reading and writing skills.
 3. Valid commercial driving license.
 4. Enjoy physical and mental health.
 5. Good technical Knowledge of vehicles.
 6. Ability to withstand the pressure of work under emergency conditions.
 7. Ability to work within the team.

ANNEXES

ANNEX 1

Schedule of meetings and field visits conducted

Meetings and field visits conducted

No	Date	Event	Institution	Place
1	Feb.4.2009	Meeting	G.D of Roads MOPWH	Ramallah
2	Feb.5.2009	Meeting	USAID/Eng Wael El sayeg	Ramallah/MOPWH
3	Feb.5.2009	Meeting	MOPWH	Ramallah
4	Feb.6.2009	Meeting	USAID WRI	Tel Aviv
5	Feb.8.2009	Meeting	MOPWH	Ramallah
6	Feb.10.2009	Field Visits	Hebron Directorate	Hebron
7	Feb.15.2009	Field Visits	Ramallah Directorate	Ramallah
8	Feb.17.2009	Field Visits	Nablus Directorate	Nablus
9	Feb.22.2009	Meeting	MOT/MOPWH	Ramallah
10	Feb.23.2009	Field visit	Ramallah Directorate	Ramallah
11	Feb.25.2009	Meeting	MOPWH	Ramallah
12	Feb.26.2009	Meeting	MOPWH	Ramallah
13	March.1.2009	Meeting	IRD	Ramallah
14	March.3.2009	Meeting	MOT	Ramallah
15	March.3.2009	Meeting	MOPWH	Ramallah
16	March.8.2009	Meeting	MOPWH/MOT/MOLG	Ramallah/MOPW
17	March.11.2009	Meeting	USAID WRI	Tel Aviv
18	March.17.2009	Phone conference	USAID	Ramallah
19	March.25.2009	Field visit	Ramallah Directorate	Ramallah
20	March.26.2009	Field visit	Ramallah Directorate	Ramallah

ANNEX 2

Three possible scenarios for Hebron Road Repair Units
(Estimated cost for raw material and equipment)

Scenario 1

EQUIPMENT

Equipments	<u>Status</u>	Condition	No.	Repair Cost (\$)	Purchase Cost (\$)	Salvage Value (\$)	Comments
Truck-Double Kappen	Available	Good	1				
Small Roller	Available	Good Fair	1 1	500			
Truck	Available	Good	2				
JCB Excavator	Available	Good	1				
Asphalt Scissor (Cutter)	Available	Fair	1	250			
Tree Scissor (Cutter)	Not Avail		1		1000		
Small Water Tank only	Not Avail		1		3000		Transport Truck avail.
Essential Hand Tools	Available	Good	8				
Bobcat Multipurpose	Not Avail.				80,000		If not approved, will need additional labor
Striping Machine	Not avail.						Available in HQ to be used by all 3 units
Jack Hammar	Not Avail.				6300		
Trolley	Not Avail.				2500		For Equipment Transport
Total				750	92800		

<u>Raw Materials</u>	<u>Unit/day</u>	<u>Cost/Unit</u>	<u>Total for 6 months (132 days)</u>
Hot AC	15 T/day	60/T	118,800
Base Materials	20 T/day	4/Ton	10,560
Liquid AC (Tack)	100 Kg/day	0.65/Kg	8580
Liquid AC Crack Seal	200 Kg/month	1.0/Kg	1200
Equipment Storage		Lump Sum	15000
Communication Sys.		175/month	1050
Total			155,190
 <u>Safety Items</u>			
Guardrail	2000 m	50/m	100,000
Sidewalk (including handrail)	2000 m	200/m	400,000
Traffic Signs	200	200/each	40,000
Total			540,000

Scenario 2:

EQUIPMENT

Equipments	<u>Status</u>	Condition	No.	Repair Cost (\$)	Purchase Cost (\$)	Salvage Value	Comments
Truck-Double Kappen	Available	Good	1				
Small Roller	Available	Good Fair	1 1	500			
Truck	Available	Good	2				
JCB Excavator	Available	Good	1				
Asphalt Scissor (Cutter)	Available	Fair	1	250			
Tree Scissor (Cutter)	Not Avail		1		1000		
Small Water Tank only	Not Avail		1		3000		Transport Truck avail.
Essential Hand Tools	Available	Good	8				
Bobcat Multipurpose	Not Avail.				80,000		If not approved, will need additional labor
Striping	Not avail.						Available in HQ to be used by all 3 units
Jack Hammar	Not Avail.				6300		
Trolly	Not Avail.				2500		For Equipment Transport
Total				750	92800		

<u>Raw Materials</u>	<u>Unit/day</u>	<u>Cost/Unit</u>	<u>Total for 6 months(32 days)</u>
Hot AC	15 T/day	60/T	118,800
Base Materials	20 T/day	4/Ton	10,560
Liquit AC (Tack)	100 Kg/day	0.65/Kg	8580
Liquid AC Crack Seal	200 Kg/month	1.0/Kg	1200
Equipment Storage		Lump Sum	15000
Communication Sys.		175/month	1050
Total			155,190

Scenario 3:
EQUIPMENT

Equipments	<u>Status</u>	Condition	No.	Repair Cost (\$)	Purchase Cost (\$)	Salvage Value (\$)	Comments
Truck-Double Kappen	Available	Good	1				
Small Roller	Available	Good Fair	1 1	500			
Truck	Available	Good	2				
JCB Excavator	Available	Good	1				
Asphalt Scissor (Cutter)	Available	Fair	1	250			
Tree Scissor (Cutter)	Not Avail		1				
Small Water Tank only	Not Avail		1				Transport Truck avail.
Essential Hand Tools	Available	Good	8				
Bobcat Multipurpose	Not Avail.						If not approved, will need additional labor
Striping Machine	Not avail.						Available in HQ to be used by all 3 units
Jack Hammar	Not Avail.						
Trolly	Not Avail.						For Equipment Transport

<u>Raw Materials</u>	<u>Unit/day</u>	<u>Cost/Unit</u>	<u>Total for 6 months (132 days)</u>
Hot AC	100 T	60/T	6,000
Base Materials	100T	4/Ton	400
Liquit AC (Tack)	100 Kg	0.65/Kg	65
Liquid AC Crack Seal	100 Kg	1.0/Kg	100
Communication Sys.		175/month	1050
Total			7,615

ANNEX 3

Three possible scenarios for Ramallah Road Repair Units
(Estimated cost for raw material and equipment)

Scenario 1:

EQUIPMENT

Equipments	<u>Status</u>	Condition	No.	Repair Cost (\$)	Purchase Cost (\$)	Salvage Value (\$)	Comments
Truck-Double Kappen	Available	Fair	1	5,000			
Small Roller	Not Avail.		1		25,000		
Truck	Available	Fair	1	4500			
JCB Excavator (Backhoe)	Avail.	Fair	1	4000			
Asphalt Scissor (Cutter)	Available	good	1				
Tree Scissor (Chain Saw)	Not Avail		1		1000		
Small Water Tank only Capacity 3 Cu.m (m3)	Not Avail		1		3000		Truck available For Transport
Essential Hand Tools	Available	Good	8				
Bobcat Multipurpose	Not Avail.		1		90,000		If not approved, will need additional labor
Striping Machine (Riding)	Not avail.		1		25,000		
Small Stiping Machine	Avail.	Fair	1	1000			Used by all 3 Units Only For Ramallah
Jack Hammar	Avail.	Good					
Trolly		poor	1		2500		For Equipment Transport
TOTAL				14,500	146500		

<u>RAW MATERIALS:</u>	<u>Unit/day</u>	<u>Cost/Unit</u>	<u>Total for 6 months (132 days)</u>
Hot AC	12.5 T/day	60/T	99,000
Base Materials	20 T/day	4/Ton	10560
Liquit AC - Tack (MC-1)	150 Kg/day	0.8/Kg	15840
Liquid AC Crack Seal (RC-2)	100 Kg/day	1.5/Kg	19800
Communication Sys.	5 phones	700/month	4200
Hot Line Set Up	Lump Sum		500
Uniforms, Gloves, coats, Rain Coats	10 people	100/person	1000
Traffic Control signs, flaggers, cones,etc	1 unit	1000/unit	1000
Total			151,900

SAFETY ITEMS:

Gaurdrail	5000 m	80/m	400,000
Sidewalk (including handrail)	2000 m	200/m	400,000
Traffic Signs	200	200	40,000
Total			840,000

Scenario 2:

EQUIPMENT

Equipments	<u>Status</u>	Condition	No.	Repair Cost (\$)	Purchase Cost (\$)	Salvage Value (\$)	Comments
Truck-Double Kappen	Available	Fair	1	5,000			
Small Roller	Not Avail.		1		25,000		
Truck	Available	Fair	1	4500			
JCB Excavator (Backhoe)	Avail.	Fair	1	4000			
Asphalt Scissor (Cutter)	Available	good	1				
Tree Scissor (Chain Saw)	Not Avail		1		1000		
Small Water Tank only	Not Avail		1		3000		Truck available For
Capacity 3 Cu.m (m3)							Transport
Essential Hand Tools	Available	Good	8				
Bobcat Multipurpose	Not Avail.		1		90,000		If not approved, will need additional labor
Striping Machine (Riding)	Not avail.		1		25,000		Used by all 3 Units
Small Stiping Machine	Avail.	Fair	1	1000			Only For Ramallah
Jack Hammar	Avail.	Good					
Trolly		poor	1		2500		For Equipment
							Transport
TOTAL				14,500	146500		

<u>RAW MATERIALS:</u>	<u>Unit/day</u>	<u>Cost/Unit</u>	<u>Total for 6 months</u> <u>(132 days)</u>
Hot AC	12.5 T/day	60/T	99,000
Base Materials	20 T/day	4/Ton	10560
Liquit AC - Tack (MC-1)	150 Kg/day	0.8/Kg	15840
Liquid AC Crack Seal (RC-2)	100 Kg/day	1.5/Kg	19800
Communication Sys.	5 phones	700/month	4200
Hot Line Set Up	Lump Sum		500
Uniforms, Gloves, coats, Rain Coats	10 people	100/person	1000
Traffic Control signs, flaggers, cones,etc	1 unit	1000/unit	1000
Total			151,900

Scenario 3:

EQUIPMENT

Equipments	<u>Status</u>	Condition	No.	Repair Cost (\$)	Purchase Cost (\$)	Salvage Value (\$)	Comments
Truck-Double Kappen	Available	Fair	1	5,000			
Small Roller	Not Avail.		1				
Truck	Available	Fair	1	4500			
JCB Excavator (Backhoe)	Available	Fair	1	4000			
Asphalt Scissor (Cutter)	Available	good	1				
Tree Scissor (Chain Saw)	Not Avail		1				
Small Water Tank only Capacity 3 Cu.m (m3)	Not Avail		1				Truck available For Transport
Essential Hand Tools	Available	Good	8				If not approved, will need additional labor
Bobcat Multipurpose	Not Avail.		1				
Striping Machine (Riding)	Not avail.		1				Used by all 3 Units Only For Ramallah
Small Striping Machine	Avail.	Fair	1	1000			
Jack Hammar	Avail.	Good					
Trolly		poor	1				For Equipment Transport
TOTAL				14,500	0		

<u>RAW MATERIALS:</u>	<u>Unit/day</u>	<u>Cost/Unit</u>	<u>Total for 6 months (132 days)</u>
Hot AC	100 T	60/T	6,000
Base Materials	100 T	4/Ton	400
Liquit AC - Tack (MC-1)	100 Kg	0.8/Kg	120
Liquid AC Crack Seal (RC-2)	100 Kg	1.5/Kg	150
Communication Sys.	5 phones	700/month	4200
Uniforms, Gloves, coats, Rain Coats	10 people	100/person	1000
Traffic Control signs, flaggers, cones,etc	1 unit	1000/unit	1000
Total			12,870

ANNEX 4

Three possible scenarios for Nablus Road Repair Units
(Estimated cost for raw material and equipment)

Scenario 1:

EQUIPMENT

Equipments	<u>Status</u>	Condition	No.	Repair Cost (\$)	Purchase Cost (\$)	Salvage Value (\$)	Comments
Truck-Double Kappen	Available	Fair	1	4,000			
Small Roller	Available	Good	2				
Truck	Available	Good	1				
JCB Excavator (Backhoe)	Not Avail.				100,000		Need with Hydraulic Hammer
Asphalt Scissor (Cutter)	Available	Good	1				
Tree Scissor (Chain Saw)	Not Avail		1		1000		
Small Water Tank only Capacity 3 Cu.m (m3)	Not Avail		1		3000		Truck avail. For Transport
Essential Hand Tools	Available	Good	8				
Bobcat Multipurpose	Not Avail.				80,000		If not approved, will need additional labor
Striping machine	Not avail.		1				Available in HQ to be used by all 3 units
Jack Hammar	Not Avail.				6300		
Trolly	Not Avail.		1		1000		For Equipment Transport
Total				4,000	191300		For Equipment Transport

RAW MATERIALS:

<u>Description</u>	<u>Unit/day</u>	<u>Cost/Unit</u>	<u>Total for 6 months (132 days)</u>
Hot AC	12.5 T/day	60/T	99,000
Base Materials	20 T/day	4/Ton	10,560
Liquid AC - Tack (MC-1)	150 Kg/day	0.8/Kg	15840
Liquid AC Crack Seal (RC-2)	100 Kg/day	1.5/Kg	19800
Communication Sys.	5 phones	175/month	1050
Uniforms, Gloves, coats, Rain Coats	10 people	100/person	1000
Traffic Control signs, flaggers, cones,etc	1 unit	1000/unit	1000
Total			148,250

SAFETY ITEMS:

Guardrail	5000 m	80/m	400,000
Sidewalk (including handrail)	5000 m	200/m	1,000,000
Traffic Signs	200	200/each	40,000
Total			1,440,000

Scenario 2:

EQUIPMENT

Equipments	<u>Status</u>	Condition	No.	Repair Cost (\$)	Purchase Cost (\$)	Salvage Value (\$)	Comments
Truck-Double Kappen	Available	Fair	1	4,000			
Small Roller	Available	Good	2				
Truck	Available	Good	1				
JCB Excavator (Backhoe)	Not Avail.		1		100,000		Need with Hydraulic Hammer
Asphalt Scissor (Cutter)	Available	Good	1				
Tree Scissor (Chain Saw)	Not Avail		1		1000		
Small Water Tank only Capacity 3 Cu.m (m3)	Not Avail		1		3000		Truck avail. For Transport
Essential Hand Tools	Available	Good	8				
Bobcat Multipurpose	Not Avail.				80,000		If not approved, will need additional labor
Striping Machine	Not avail.		1				Available in HQ to be used by all 3 units
Jack Hammar	Not Avail.				6300		
Trolly	Not Avail.		1		1000		For Equipment Transport
Total				4,000	191300		For Equipment Transport

RAW MATERIALS:

<u>Description</u>	<u>Unit/day</u>	<u>Cost/Unit</u>	<u>Total for 6 months (132 days)</u>
Hot AC	12.5 T/day	60/T	99,000
Base Materials	20 T/day	4/Ton	10,560
	150		
Liquid AC - Tack (MC-1)	Kg/day	0.8/Kg	15840
	100		
Liquid AC Crack Seal (RC-2)	Kg/day	1.5/Kg	19800
Communication Sys.	5 phones	175/month	1050
Uniforms, Gloves, coats, Rain Coats	10 people	100/person	1000
Traffic Control signs, flaggers, cones,etc	1 unit	1000/unit	1000
Total			148,250

Scenario 3:

EQUIPMENT

Equipments	<u>Status</u>	Condition	No.	Repair Cost (\$)	Purchase Cost (\$)	Salvage Value (\$)	Comments
Truck-Double Kappen	Available	Fair	1	4,000			
Small Roller	Available	Good	2				
Truck	Available	Good	1				
JCB Excavator (Backhoe)	Not Avail.		1				Need with Hydraulic Hammer
Asphalt Scissor (Cutter)	Available	Good	1				
Tree Scissor (Chain Saw)	Not Avail		1				
Small Water Tank only Capacity 3 Cu.m (m3)	Not Avail		1				Truck avail. For Transport
Essential Hand Tools	Available	Good	8				
Bobcat Multipurpose	Not Avail.						If not approved, will need additional labor
Striping Machine	Not avail.		1				Available in HQ to be used by all 3 units
Jack Hammar	Not Avail.						
Trolly	Not Avail.		1				For Equipment Transport
Total				4,000	0		

RAW MATERIAL:

<u>Description</u>	<u>Unit/day</u>	<u>Cost/Unit</u>	<u>Total for 6 months (132 days)</u>
Hot AC	100 T	60/T	6,000
Base Materials	100 T	4/Ton	400
Liquit AC - Tack (MC-1)	100 Kg	0.8/Kg	80
Liquid AC Crack Seal (RC-2)	100 Kg	1.5/Kg	150
Communication Sys.	5 phones	175/month	1050
Uniforms, Gloves, coats, Rain Coats	10 people	100/person	1000
Traffic Control signs, flaggers, cones,etc	1 unit	1000/unit	1000
Total			9,680

Annex 5

Work Instructions